ESKOM KRIEL POWER STATION –

PROPOSED EXPANSION OF ASH DISPOSAL FACILITY

AQUATIC AND TERRESTRIAL ECOLOGICAL ASSESSMENT

Environmental Impact Assessment

DRAFT REPORT V3

Prepared for:
AURECON South Africa (Pty) Ltd
81 Church Street
Cape Town
8000

Prepared by:

Scherman Colloty & Associates
Postnet Suite 25
Private Bag 1672
GRAHAMSTOWN
6140

20 June 2017

SPECIALIST REPORT DETAILS

This report has been prepared as per the requirements of the Environmental Impact Assessment Regulations and the National Environmental Management Act (Act 107 of 1998), any subsequent amendments and any relevant National and / or Provincial Policies related to biodiversity assessments.

Report prepared by: Dr. Brian Colloty Pr.Sci.Nat. (Ecology) / Certified EAP / Member SAEIES & SASAqS and Mr. Lukas Niemand MSc Pr.Sci.Nat. (Ecology & Zoology) of Pachnoda Consulting

Expertise / Field of Study of authors:

Brian holds the following degrees, BSc (Hons) Zoology, MSc Botany (Rivers), Ph.D Botany Conservation Importance rating (Estuaries) and has conducted interior wetland assessment from 2002 to present.

I, **Dr. Brian Michael Colloty** declare that this report has been prepared independently of any influence or prejudice as may be specified by the National Department of Environmental Affairs (DEA)

Signed:…Date: 20 June 2017……

Lukas holds a BSc (Hons) Zoology, MSc Restoration Ecology and terrestrial ecologist from 2002 to present.

I, **Lukas Niemand** declare that this report has been prepared independently of any influence or prejudice as may be specified by the National Department of Environmental Affairs (DEA)

Signed:….Date:…20 June 2017……

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ACRONYMS

DWS	Department of Water and Sanitation (Previously Department of Water Affairs, DWA)
EIA	Environmental Impact Assessment
GIS	Geographic Information System
Ha	Hectare
IUCN	International Union for Conservation of Nature
MBSP	Mpumalanga Biodiversity Sector Plan
MTPA	Mpumalanga Tourism and Parks Agency
NSBA	South African - National Spatial Biodiversity Assessment
PES	Present Ecological State
QDGC	Quarter degree grid cells
SABAP	South African Bird Atlas Project
SANBI	South African National Biodiversity Institute
SARCA	South African Reptile Conservation Assessment
SC&A	Scherman Colloty & Associates
WULA	Water Use licence

Content of Specialist Report as per Appendix six of the NEMA EIA Regulations of 2014

(1) A specialist report prepared in terms of these Regulations must contain-	Section
(a) details of- (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page 2 & EIA appendices
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page 2 and EIA appendices
(c) an indication of the scope of, and the purpose for which, the report was prepared;	Section 1 Page 7
(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Winter and Summer periods were surveyed between 2011 and 2016
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	Section 4 page 10
(f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	Section 6 Page 22
(g) an identification of any areas to be avoided, including buffers;	Section 6 Page 22
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 6 Page 22
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.3 Page 8
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	Section 5
(k) any mitigation measures for inclusion in the EMPr;	Section 7 and 8
(l) any conditions for inclusion in the environmental authorisation;	Section 8
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 8
(n) a reasoned opinion- (i) as to whether the proposed activity or portions thereof should be authorised; and (ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 8
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	See EIA report
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	See EIA report
(q) any other information requested by the competent authority.	See EIA report

1 Introduction

Scherman Colloty & Associates cc (SC&A) assisted by Pachnoda Consulting were appointed by Aurecon South Africa (Pty) Ltd (Aurecon) as independent specialists to evaluate the ecological importance and function the proposed ash dam site. This report then follows on from scoping level report that provided a series of site selection criteria to help identify areas for potential development from a terrestrial and aquatic ecological perspective. The Scoping level data, together with the first baseline survey data, coupled to various geotechnical and engineer constraints indicated that focus must be on the preferred site (Site 10) as shown in Figure 1 and 2. The study area hereafter referred to as Site 10, includes several footprints or development areas, related to the ash dams, return water dams and stockpile areas required.

Several important national and provincial conservation plans were also reviewed, with the results of those studies being included in this report. Most conservation plans are produced at a course scale so the actual status of the study area would then be determined during the assessments.

Also in line with biodiversity assessment guidelines, delays in the site and design process of the dam, also allowed for an opportunity to assess the site during the wet / summer season, noting that the original layout of the dam at Site 10 has also changed from the Scoping Phase.

1.1 Terms of reference

The main aim of this report is to investigate the ecological attributes of the study site by means of a desktop analysis of all the latest literature (See Section 1.2 below) and information at hand, coupled to dry and wet season surveys.

The terms of reference for this assessment were to:

- Conduct an assessment of available information pertinent to ecological and biophysical attributes of the proposed site;
- Conduct an assessment of all information in order to present the following results:
    - Typify the vegetation that will be affected by the proposed development;
    - Highlight areas of terrestrial and aquatic sensitivity; and
    - Assess the impacts and provide suitable management actions and mitigations.

1.2 Literature Consulted

- Mpumalanga Biodiversity Conservation Plan (C-plan) of Lötter & Ferrar, 2006 (2007), which has been replaced by the 2014 Mpumalanga Biodiversity Sector Plan (Lotter, 2014);
- The occurrence and conservation status of mammal taxa were based on Friedmann & Daly (2004), while mammalian nomenclature was based on Skinner & Chimimba (2005);
- Taylor *et al.* (2016) was consulted for information regarding the IUCN status (Red Data) of bird taxa, while the distribution of birds taxa was verified against South African Bird Atlas Project 2 database (www.sabap2.adu.org.za);
- The occurrence of conservation important reptile taxa was based according to the dated assessment conducted by Bates, *et al.* (2014) and the South African Reptile Conservation Assessment (SARCA; www.saherps.net/sarca/index.php);
- Red Data categories and listings of amphibian taxa follow Minter *et al.* (2004); and
- National Spatial Biodiversity Assessment, National Wetland Inventory (Wetland Inventory 5.2) and the VegMap (Mucina & Rutherford, 2009, but inclusive of the 2012 mapping changes) all found in the BioGIS database site of the South African National Biodiversity Institute. This database also includes the mapping layers and metadata contained in the Mpumalanga Biodiversity Conservation Plan maps (http://bgis.sanbi.org).

Additional data or information was also obtained from past investigations conducted by the authors of this report for other projects / EIA's within the area.

1.3 Limitations

In order to obtain a comprehensive understanding of the dynamics of the faunal community on the study site, as well as the status of endemic, rare or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time constraints such long-term studies are not feasible and are mostly based on instantaneous sampling bouts.

It should be emphasised that information, as presented in this document, only has reference to the study site as indicated on the accompanying maps. This information cannot be applied to any other area without detailed investigation. It should also be noted that the study occurred in early spring and large portions of the site had recently been burnt, however a second site visit was conducted a few years later, in mid-summer with the results of which (if any different) are included in this report.

This company, the consultants and/or specialist investigators do not accept any responsibility for conclusions, suggestions, limitations and recommendations made in good faith, based on the information presented to them, obtained from the surveys or requests made to them at the time of this report.

2 Project locality

The overall study area is located in close proximity to the Eskom Kriel Power Station, in the Mpumalanga Province (Figure 1 & 2). Nineteen potential ash dam sites were originally investigated, within a 12 km radius of the Kriel Power Station, with one site being selected for the detailed EIA phase investigation. This site correspond to the Farms Driefontein 65 IS, Driefontein 69 IS, Onverwacht 70 IS, hereafter referred to as Site 10 (Figure 1 & 2).

The total surface area of Site 10 is 352 ha in extent.

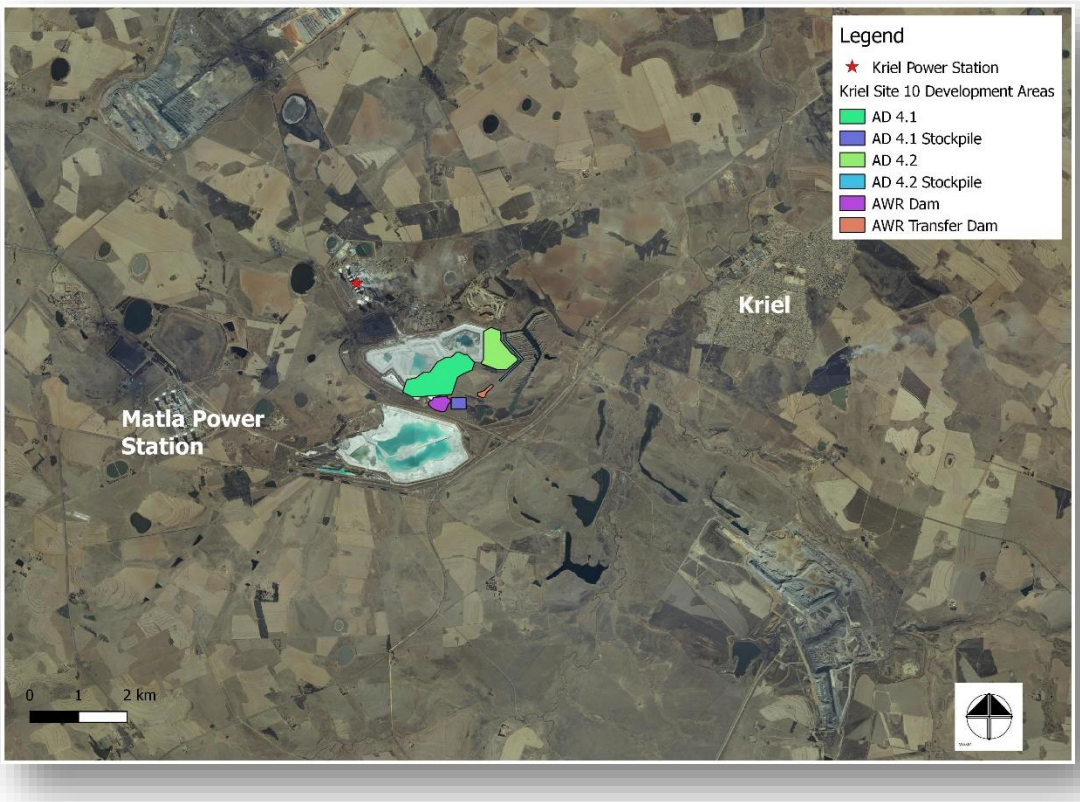

Figure 1: Aerial image showing the proposed ash dam infrastructure in relation to other power stations and towns

Figure 2: Aerial image zoomed in showing the position of the proposed ash dams, return water dams and stockpile areas

3 Project description

The following description was extracted from the main chapter of the EIA document as received from Aurecon:

The construction of Kriel Power Station (owned by Eskom Holdings SOC Limited, Eskom) was completed in 1979 and was considered to be the largest coal-fired power station in the southern hemisphere at the time (see Figure 3-1). The 38 year old power station, with an installed capacity of 3 000 MW (Eskom, 2010), is located approximately 7 km west of the small town of Kriel (also known as Ga-nala) in the Mpumalanga Province. Through the process of electricity generation, coarse and fine ash is produced by burning coal. At full capacity, each of the six boilers can produce up to 740 000 tonnes/year of coarse ash/ boiler bottom ash (approximately 20% of total ash produced) ash and 2 960 000 tonnes/year of fly ash/ precipitator fly ash (approximately 80% of total ash produced).

Figure 3-1| Location of the Kriel Power Station and current ash dam complex

Kriel Power Station makes use of a wet ashing process to dispose of its ash. Coarse ash is transferred with a small volume of fine ash (fly ash, to limit pipeline wear) from the Power Station to sumps, from where it is pumped as a slurry mixture to the Wet Ash Disposal Facilities (WADF)[1] (ash dams). The fine ash is transported separately to the existing ash dam complex, via two conveyors that are located south-east of Kriel Power Station. As mentioned above, Kriel uses wet ashing system, which involves conditioning fly ash and coarse ash with water for pneumatic transportation to the ash dams through conveyor belts and ash lines, respectively.

Upon reaching the ash dams, conditioning water, from ash, sluices into the designed lowest point of ash dam wherein it gets drained through penstocks. All the water collected from Kriel ash dams through the penstocks is stored in Ash Water Return (AWR) dams. From the AWR dams the ash water gravitates to a manifold and is then pumped back to a High Level AWR dam. From the High Level AWR dam the water gravitates to the pollution control dams known as the Borrow Pits and Swartpan. The Borrow Pits contain mainly excess ash water from High Level AWR dam while Swartpan contains mainly excess overflow ash water from the Borrow Pits. Both Swartpan and the Borrow Pits dams are part of ash water cycle and are used as emergency containment dams. This water is then pumped from Swartpan for re-use by the Power Station for ashing purposes (Kriel Power Station, 2016).

The three existing ash dams will reach their capacity by end July 2021. Eskom is, thus, proposing to expand its existing ash disposal facility by constructing and commission an additional ash disposal facility footprint before the existing ash dams reach their capacity in 2021.

The complete proposed expansion with new ash dams (AD4.1, AD4.2 and AD4.3) (see Figure 3-2) would fulfil the ash disposal requirements for the Power Station's extended -operational life, whereby decommissioning of the six generating units is planned to commence in 2039. AD4.3 is however located on a previously mined and backfilled area, which needs to be tested first for stability. The expansion project is, therefore, divided into two phases, namely Phase 1, which covers construction of AD4.1 and AD4.2 (the subject of this application) (see Figure 3-3) and Phase 2 which covers AD4.3. A Monitored Test Embarkment is underway for AD4.3 and therefore this EIA only deals with Phase 1. Once the stability of AD4.3 has been confirmed, depending on the results, an additional EIA may be undertaken for AD4.3. To smoothen the decommissioning process, a five year contingency has been allowed for, thus it is assumed that the Power

[1] Wet Ash Disposal Facility is also referred to as an Ash Dam

Station will be operated for an additional five years, thereby allowing for the power station decommissioning from 2041 to 2045.

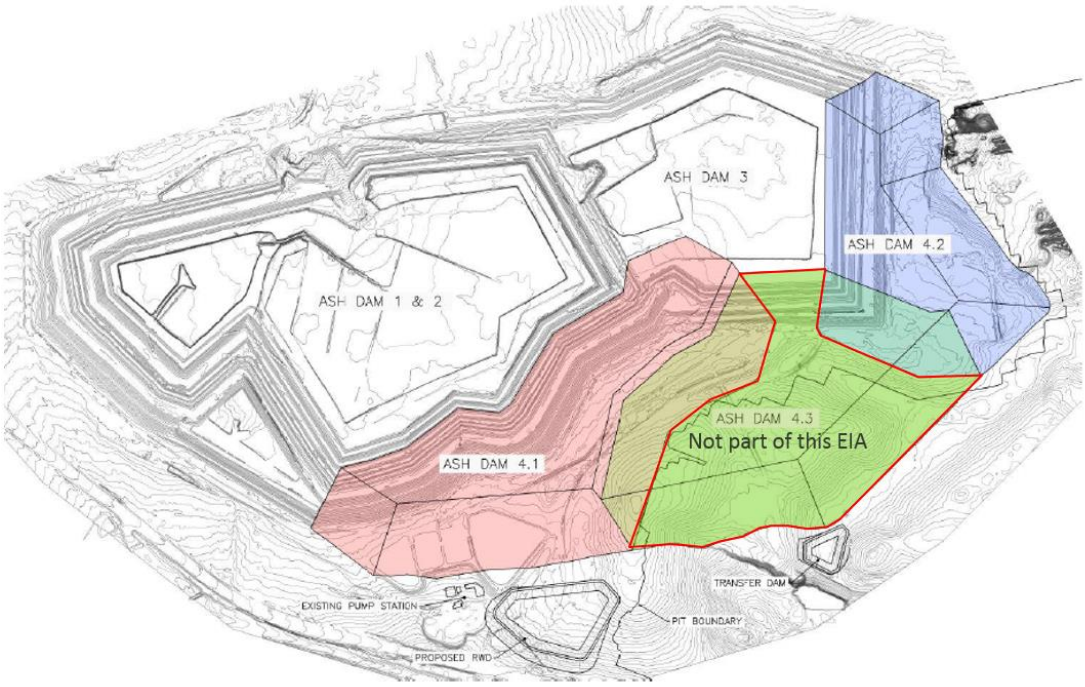

Figure 3-2| Ash Dam 4 Concept (Source: JW044/16/E821)

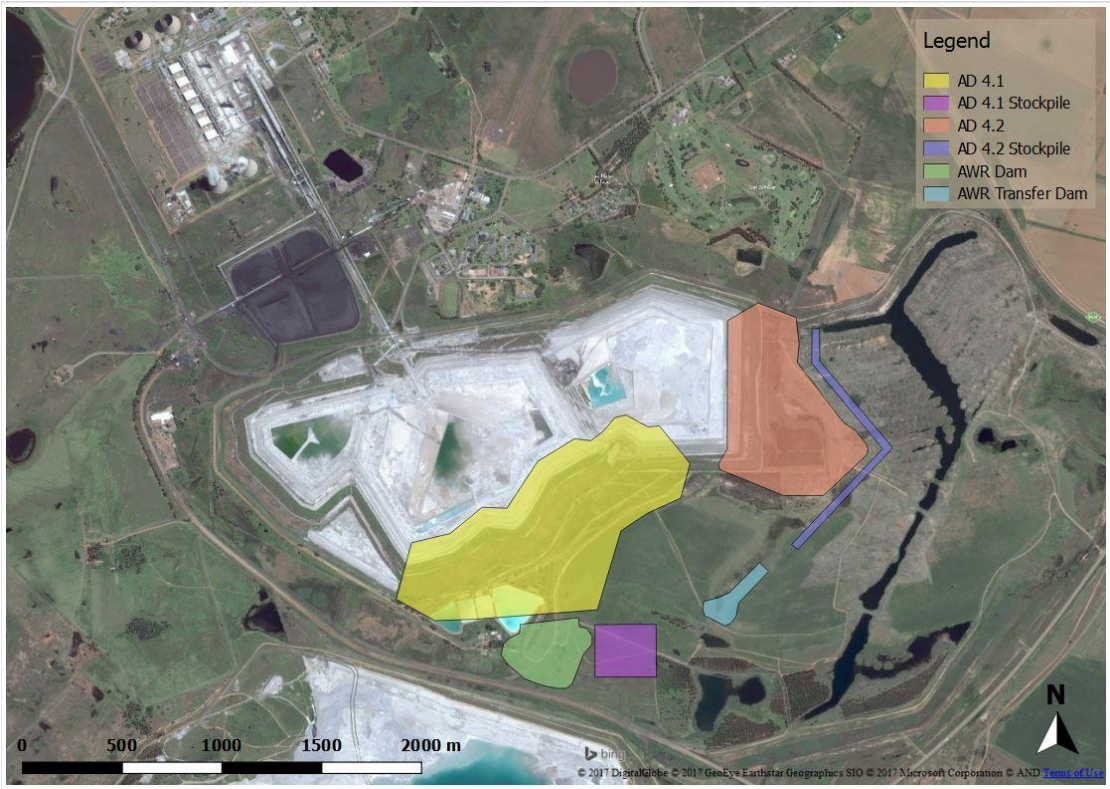

Figure 3-3| Phase 1, construction of AD4.1 and AD4.2 (the subject of this application)

The development of ash dam 4 will be sequenced to distribute large immediate capital expenditure cost. Dam 4.2 will be developed first in 2021 and will utilize a ring main system to distribute ash within the ash dam basin. Water generated on the dam will be decanted into solution trenches, running along the toe of the new dams, utilizing penstocks and subsoil drains. Ash water from Dam 4.2 will be gravitated to a transfer dam from where it will be pumped to the AWR dam.

Deposition was split between the existing and new dams in order to reduce the height of the preliminary starter walls, as well as the final height of the new dams. It was assumed that deposition on the existing dams will continue for 4 years after the commissioning of the first phase of AD4 (i.e. until the final phase of AD4 is commissioned). Once AD4.1, AD4.2 *and AD4.3*[2] are operational, the existing dams will be decommissioned, and rehabilitated. A period of two (2) years was allowed for between the construction phases of AD4 in order to defer large immediate capital costs. Thus, after AD4.2 is commissioned in July 2021, AD4.1 will be commissioned in July 2023, *and subsequently AD4.3 in July 2025*.

From the AWR dam, ash water will be pumped back to the power station and ash dam pump-house to be reused in the placement of ash from the power station.

This EIA process covers only AD4.1 and AD4.2 as well as the associated infrastructure that will be developed, including a Transfer Dam. The infrastructure includes pipes and a Transfer Dam that will be located on the mine backfilled area (*just South of the proposed siting for AD4.3*). A Class C liner has been provided for the ash dams (AD4.1 and AD4.2) and the Transfer Dam, which also has an addition of a concrete liner for maintenance purposes. Geotechnical studies will be conducted in the detail design phase and is expected to provide sufficient information to allow for the appropriate design of the transfer dam and infrastructure.

Stability of the Transfer Dam (vetted by Designer & Chief Engineering Geotechnical Engineering):

The Transfer Dam is not sized or designed to store any water. The Transfer Dam is designed to collect return water from Dam 4.2 and pump to the AWRD. This will be a continuous process and operations must comply as such;

The design premise of the Transfer Dam's placement & construction is that the weight of the soil in that position (pre-construction) is heavier than the weight of water;

The Transfer Dam position abuts the old Starter Wall of the Pit 2 backfills. Therefore, the Starter Wall would have been compacted and consolidated. The Basin of Transfer Dam is founded on the ash behind the Starter Wall, which would have consolidated after 20 years;

It is also assumed that the soil/ash at that position has caused localised consolidation over time, so no loose soils are expecting directly under the Transfer Dam; and

Therefore, the Transfer Dam will not add weight to the environment & therefore not induce deep settlements.

Going forward in the design, the Transfer Dam will take the detailed geotechnical information into account to design layer works below the Transfer Dam's base. This should ensure that there are no settlements, as any settlement would misalign the pipeworks.

NB. Within the Transfer Dam design the liner is accessible and can be repaired if compromised.

The attached map (Figure 3-3) is based on the latest layout received from Eskom. Note that the layout of AD4.1 and AD4.2 has not changed – only the associated infrastructure has changed slightly. These locations for the ash dams were used by all specialists. The change in layout for the associated infrastructure did not affect the outcome of the specialist assessments.

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It is also assumed that the soil/ash at that position has caused localised consolidation over time, so no loose soils are expecting directly under the Transfer Dam; and Therefore, the Transfer Dam will not add weight to the environment & therefore not induce deep settlements.

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NB. Within the Transfer Dam design the liner is accessible and can be repaired if compromised."

[2] AD4.3 will be implemented if deemed feasible and needed

4 Methods

Site visits were conducted during early winter (2011/2012) and mid-summer (2016) to determine the location and extent of any sensitive areas earmarked during scoping process. Fieldwork included visual sightings by means of transect walks and plot-based sampling. Particular attention was paid to the occurrence Red Data species or species with special concern as indicated in the conservation plans.

Vegetation

The vegetation was sampled by means of the following techniques as per each site:

- Data collection was plot-based were a sample would entail the identification of each taxon together with an estimate its cover and abundance. This was then used to characterise the dominant vegetation units within the study area;
- Species specific observations focused on the following:
    - Threatened, endemic or rare species, with an indication of the relative
    - Invasive or exotic species present in the area
    - The functional and conservation importance of all vegetation communities in the area of investigation

The information provided in this report was principally sourced from (1) relevant literature, (2) personal observations from similar habitat types in close proximity to the study site and (3) a recent site visit.

Mammals

Mammals were identified by visual sightings during random transect walks. In addition, mammals were also identified by means of spoor, droppings, roosting sites or likely habitat types.

Avifauna

Birds were identified from the study site by means of random transect walks. Species, where necessary, were verified using Roberts Birds of Southern Africa, VIIth ed. (Hockey *et al*., 2005). Birds were also identified by means of their calls and other signs such as nests, discarded egg shells (Tarboton, 2001) and feathers.

Herpetofauna

Possible burrows, or likely reptile habitat (termitaria, stumps or rocks) were inspected for any inhabitants. Amphibians were also identified by their vocalisations and through likely habitat types (e.g. water features, drainage lines, etc.). However, the herpetofaunal assessment focussed largely on a desktop review.

Aquatic ecology - Wetlands and rivers

As highlighted in the scoping study a large proportion of the available habitat related to sensitive or important taxa, is associated with the wetland / riverine habitats. This study thus focuses on the following:

- Delineation of the wetland and river boundaries using the requisite techniques based upon the latest Wetland Classification systems (Ollis, *et al*, 2013);
- Indicate suitable buffer zones as prescribed by the relevant provincial policies / conservation plans
- Assess the potential impacts on water quality and quantity that may arise from the proposed dams

5 Results

5.1 Generalised vegetation description & ecological perspective

The study area consists of two broad land cover classes which include mined land (slimes dam) and post-mined rehabilitated grasslands (Figure 3). In fact, the rehabilitated grasslands on Site 10 were expected to be poor in floristic richness, and were dominated by secondary taxa such as *Eragrostis curvula*, *E. plana* and *Hyparrhenia hirta*. These species were again confirmed dominant with in the new layout during the 2016 assessment, and were being heavily grazed (most of the fences having been removed to gain access for the cattle). Thus, the expectation of the site containing limited or poor species assemblages was confirmed by the field observations over time.

The area adjacent to Site 10 consists of an old void that was subsequently been colonised by cliff-nesting bird species, in particular one to two pairs of the “vulnerable” Southern Bald Ibis (*Geronticus calvus*), observed breeding/roosting within the void system. Therefore, the nearest roosting individuals were observed approximately 400 m east of the closest development area within Site 10 (Figure 4). During the 2016 assessment, no evidence of these birds or their nests were observed within the site, but individuals were feeding further east of the site.

5.2 Vegetation types

The study site corresponds to the Grassland Biome and more particularly to the Mesic Highveld Grassland Bioregion as defined by Mucina & Rutherford (2009). It comprehends an ecological type known as the Eastern Highveld Grassland (Figure 5).

This grassland type is restricted to undulating plains and includes a number of low hills and pan depressions. The pan depressions, although not within the study area (Site 10), but are an important regional consideration since they provide critical important foraging habitat for two “Near-threatened” flamingo species as well as a number of waterbird species.

The vegetation is short and dominated by graminoid species of the genera *Themeda, Aristida, Agrostis* and *Eragrostis*. Nearly 44% of this grassland type is already transformed by cultivation, coal mining and the creation of artificial impoundments. Although the latter has contributed to the regional waterfowl diversity, severe transformation by opencast mining activities has led to the demise of the local biodiversity that historically occupied the area.

Table 1 summarises a list of plant species characteristic of the Eastern Highveld Grassland, most of which were confirmed after the 2016 visit (i.e. optimal growing conditions).

Table 1: A list of the characteristic plant species for each stratum (e.g. grass, forb & woody layer) representing Eastern Highveld Grassland (Mucina & Rutherford, 2009).

Eastern Highveld Grassland		
Grassy Layer	**Forb Layer**	**Woody Layer**
Aristida aequiglumis, A. congesta, A. junciformis, Brachiaria serrata, Cynodon dactylon, Digitaria monodactyla, D. tricholaenoides, Elionurus muticus, Eragrostis chloromelas, E. curvula, E. plana, E. racemosa, E sclerantha, Heteropogon contortus, Loudetia simplex, Microchloa caffra, Monocymbium ceresiiforme, Setaria sphacelata, Sporobolus africanus, S. pectinatus, Themeda triandra, Trachypogon spicatus, Tristachya leucothrix, T. rehmannii, Andropogon appendiculatus, A. schirensis, Diheteropogon amplectens, Eragrostis capensis, Harpochloa falx, Schizachyrium sanguineum, Setaria nigrirostris.	***Non-succulent herbs**: Berkheya setifera, Haplocarpha scaposa, Justicia anagalloides, Pelargonium luridum, Acalypha angustata, Dicoma anomala, Helichrysum aureonitens, H. rugulosum, Pentanisia prunelloides, Senecio coronatus, Vernonia oligocephala.* ***Geophytic herbs**: Gladiolus crassifolius, Hypoxis rigidula, Ledebouria ovatifolia.* ***Succulent herb**: Aloe ecklonis.* ***Low shrubs**: Anthospermum rigidum, Stoebe plumosa.*	-

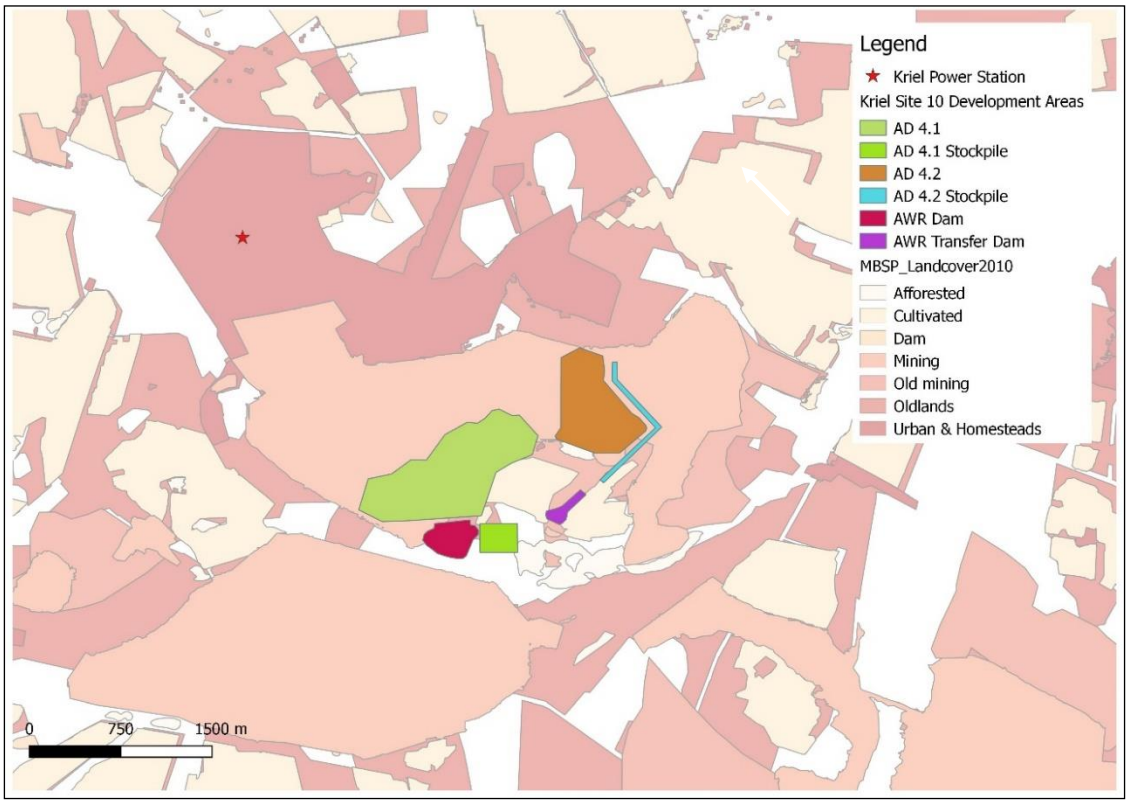

Figure 3: A map illustrating the land cover classes corresponding to Site 10.

Figure 4: Photos of the old void system that is located adjacent to Site 10. Note the nearby Southern Bald Ibis (*Geronticus calvus*) roosting site (see arrow).

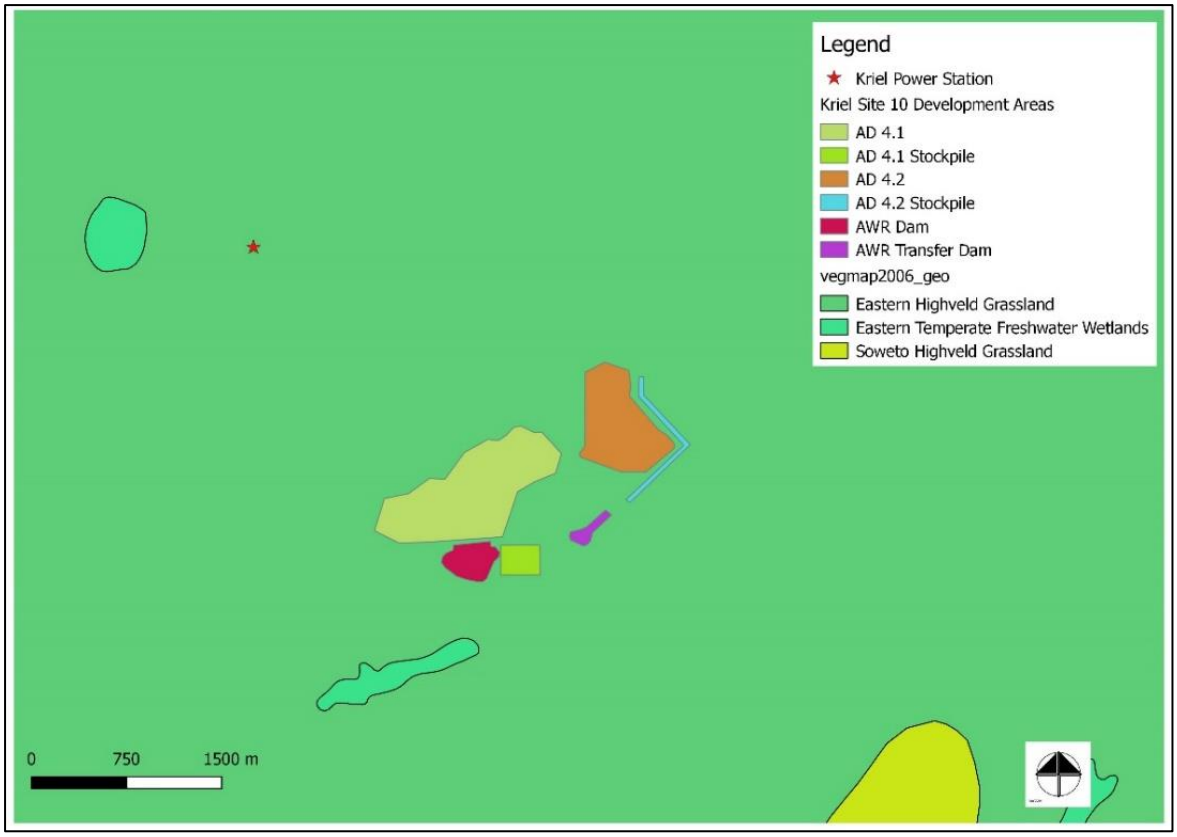

Figure 5: The spatial position of Site 10 in relation to the regional vegetation types as defined by Mucina & Rutherford (2009).

5.3 Mpumalanga Biodiversity Sector Plan

According to Lötter (2014), most of the surface area of the site is zoned as "Heavily or moderately modified", while a small portion was categorised as "Other natural Areas" (Figure 6 & 7) with regard both terrestrial and aquatic Critical Biodiversity Areas. The study area is not considered to be a conservation priority by the local authorities as a result of habitat transformation and current agricultural activities.

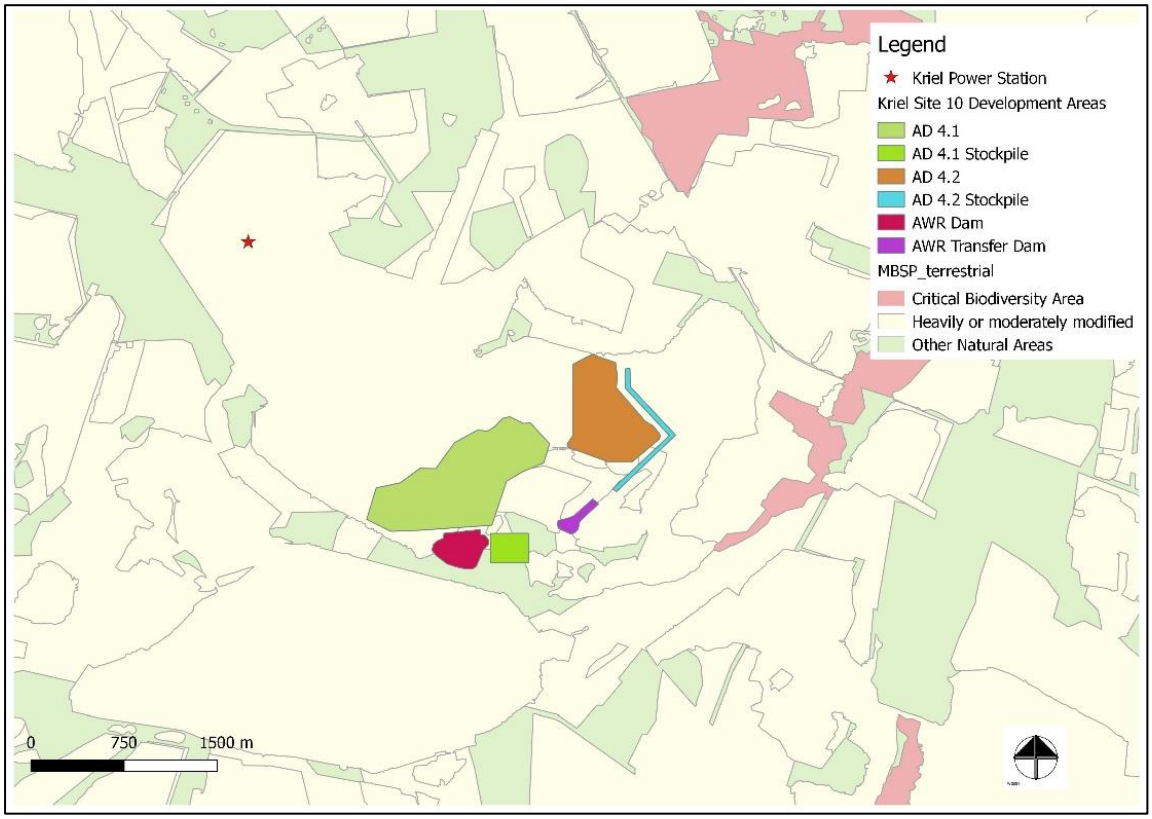

Figure 6: A map illustrating Mpumalanga Biodiversity Sector Plan (2014) terrestrial Critical Biodiversity areas

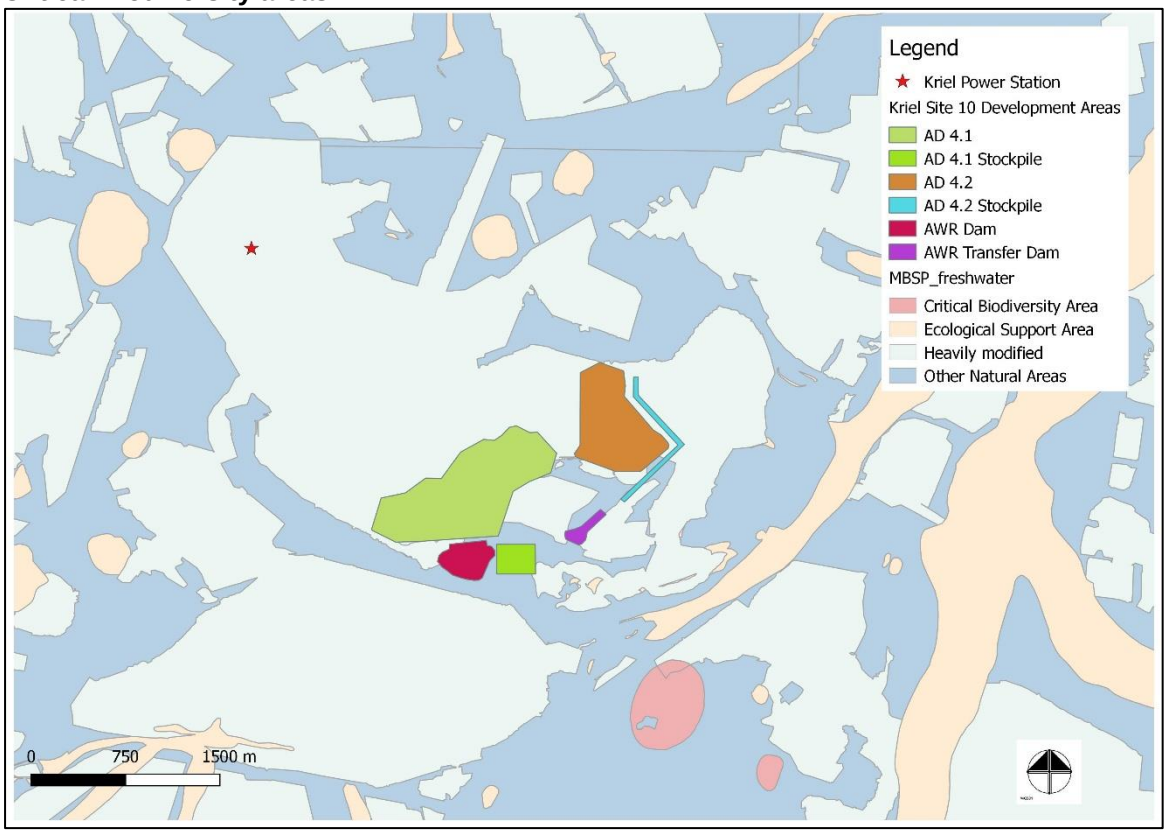

Figure 7: A map illustrating Mpumalanga Biodiversity Sector Plan (2014) aquatic Critical Biodiversity areas related to Site 10

5.4 Fauna

5.4.1 Mammals

Species richness and composition

Of the approximate 164 mammal species recorded from Mpumalanga (according to Emery *et al*., 2002), a total of 31 species could occur on the study site (Appendix 1) of which 6 (19%) were confirmed during the site visits and observed directly within or adjacent to Site 10 (Table 2). Among those confirmed were two antelope species, three rodents, one canine (jackal), two herpestids and one leporid (hare).

The mammal richness on the site is considered low and reflected by opportunistic and widespread species with unspecialised life-histories. The observed richness is best explained by the absence of natural wetland features and previous disturbance regimes that contributed to large-scale habitat modification as seen by the past mining activities, current grazing regimes and alien tree woodlots.

Table 2: An inventory of mammalian taxa observed from two sites visit conducted on 24 / 25 July 2011 and 14/15 December 2016.

Scientific Name	Vernacular Name	Observed Indicator	Observed Habitat
Canis mesomelas	Black-backed Jackal	Spoor & droppings	Widespread – Site 10.
Galerella sanguinea	Slender Mongoose	Visual sightings	Widespread – Site 10.
Hystrix africaeaustralis	Cape Porcupine	Spoor	Widespread – Site 10.
Lepus saxatilis	Shrub Hare	Droppings	Widespread, all areas.
Otomys sp.	Vlei Rat	Droppings	Recorded from damp grassland near Site 10.
Raphicerus campestris	Steenbok	Spoor	Widespread – mainly recorded from Site 10
Sylvicapra grimmia	Common Duiker	Spoor	Widespread – mainly recorded from Site 10.
Tatera brantsii	Highveld Gerbil	Burrows	Very common, restricted to sandy soils along the edges of agricultural fields and overgrazed grassland.

Experience (personal observations) from similar environmental conditions also dictates an abundant occurrence of meso-predators that will invariably utilise the cultivated lands as "temporary" movement corridors during foraging bouts. Recent observations from nearby areas have shown that the cultivated lands provide an alternative food resource for carnivore species (i.e. Black-backed Jackal *Canis mesomelas* and Cape Fox *Vulpes chama*) as evidenced by the frequent occurrence of undigested corn in their droppings (see EkoInfo & Associates, 2010).

Species of conservation concern

1. Serval (Leptailurus serval) – "Near-threatened"

The Serval is listed as "Least Concern" on the global *IUCN Red List* (ver 2016.3) although Friedmann and Daly (2004) have listed it as "near-threatened". Servals show a wide distribution range, although they are limited by their obligate preference for surface water. Therefore, they are always found near water and in areas with sufficient shelter such as tall grass (Skinner & Smithers, 1990) with an abundance of suitable prey – mainly Murid rodents (e.g. genera *Mastomys, Mus* and *Otomys*).

The serval is expected to be rare on the proposed study site due to the absence of suitable habitat.

2. Brown Hyaena (Parahyaena brunnea) – "Near-threatened"

The Brown Hyaena is listed as "near-threatened" on the global *IUCN Red List* (Wiesel, 2015) since it requires extensive areas (sometimes in excess of 1000 km^2) to maintain a viable population, especially where inter-specific competition for recourses is fierce with other predator taxa. Such massive home ranges coincide with livestock and agricultural areas where they are heavily persecuted by farmers. Therefore, persecution and the loss of habitat due to agriculture are some of the primary threats of this species

The status of this species on the study area remains unclear although it is regarded as an uncommon visitor to the proposed site.

4. Shrew Taxa – "Data Deficient"

All shrew taxa (genera *Crocidura*) are classified as "Data Deficient" (Friedmann & Daly, 2004) and could occur on the proposed study site. These species are by no means rare or uncommon, although seldom encountered due to their shy and retiring habits.

Biodiversity value and ecological considerations:

1. The study site sustains low mammal diversities. The observed richness on the site is best explained by the absence of primary grasslands and wetland features (the site is dominated by cultivated land and secondary rehabilitated grassland). From the observations, it appears that Site 10 supports about 9 confirmed species due to the presence of secondary grasslands.

2. The available habitat types provide ephemeral foraging habitat for larger mammal taxa (e.g. antelopes and meta-predators) which are seldom resident but nomadic in the area.

3. The study site is capable of sustaining a mammal community composed of widespread and opportunistic species.

5.4.2 Amphibians

Species richness and composition

Of the 51 species of amphibians occurring in Mpumalanga (Minter *et al.,* 2004), 13 taxa could occur on the study site (Site 10: 13 species) (Appendix 2). However, two of these have distribution patterns peripheral to the study area and are believed to be sporadic on the sites.

Species of conservation concern

Currently, none of the frog species under consideration are Red listed (Minter *et al.*, 2004).

Biodiversity value and ecological considerations

The expected frog species breed mostly in temporary waterbodies and inundated grassland. Site 10 provides some ephemeral breeding habitat for many of the expected species in the form of old dams and ponds related to the past mining activities. It is worth mentioning that the species diversity consists of widespread species that are common within their respective distribution ranges.

5.4.3 Reptiles

Species richness and composition

14 taxa (comprising of 9 snakes and 5 lizard species [scincids & gekkonids]; Table 3) have been recorded from the QDG cells 2629AA, 2629AB and 2629AC (information obtained from the South African Reptile Conservation Assessment (SARCA)).

The expected richness represents an underestimation of the reptile diversity likely to occur. Therefore, it is possible that many more species could exist on the study site although current distributional data is lacking in this regard.

Table 3: An inventory of reptile species confirmed from QDG cells 2629AA, 2629AB and 2629AC.

Scientific Name	Vernacular Name	Probability of occurrence
Acontias gracilicauda gracilicauda	Thin-tailed Legless Skink	Localised, could occur.
Aparallactus capensis	Cape Centipede Eater	High, likely to occur.
Crotaphopeltis hotamboeia	Herald Snake	High, likely to occur.
Hemachatus haemachatus	Rinkhals	High, likely to occur.
Lamprophis capensis	Brown House Snake	High, likely to occur.
Leptotyphlops scutifrons conjunctus	Eastern Cape Worm Snake	High, likely to occur.
Lycodonomorphus rufulus	Common Brown Water Snake	High, likely to occur.
Pachydactylus affinis	Transvaal Thick-toad Gecko	Low-Medium, partial to outcrops and termitaria.
Pachydactylus capensis	Cape Thick-toed Gecko	High, could occur although partial to outcrops and.
Psammophis brevirostris	Short-snouted Sand Snake	High, likely to occur.
Psammophylax rhombeatus	Spotted Skaapsteker	High, likely to occur.
Trachylepis capensis	Cape Skink	High, likely to occur.
Trachylepis punctatissima	Mountain Skink	High, likely to occur.
Typhlops bibronii	Bibron's Blind Snake	High, likely to occur.

5.4.4 Birds

According to the South African Bird Atlas Project (SABAP1) (Harrison *et al*., 1997), an average of 185 bird species have been recorded from the quarter degree grid cells (QDGC) that overlaps with the study site. However, recent data suggests that the diversity of habitat types prevalent on the study site is more likely to sustain approximately 50 species (www.sabap2.adu.org.za): A total of 27 species were confirmed from the site during the surveys (Appendix 3).

Red listed, "near-threatened" and "data deficient" species

Table 4 provides a list of 16 Red listed bird species that could utilise the study site based on their respective breeding, roosting and foraging requirements. However, only two species were recorded from the study site, namely the "vulnerable" Southern Bald Ibis (*Geronticus calvus*) and the "near-threatened" Lanner Falcon (*Falco biarmicus*). Both these species were observed from the old void system near Site 10.

Table 4: A list of Red Data species that could occur on the study site (according to Harrison *et al.,* 1997; Barnes, 2000). Species highlighted in grey were recorded from the study site.

Species	Red Data Status	Preferred Habitat	Potential Likelihood of Occurrence
Anthropoides paradiseus (Blue Crane)	Vulnerable	Prefers open pristine grasslands, as well as wetland habitats.	A rare visitor on the study site.
Circus macrourus (Pallid Harrier)	Near-threatened	Considered a vagrant to South Africa.	An erratic summer visitor on the area.
Circus ranivorus (African Marsh Harrier)	Vulnerable	Restricted to permanent wetlands with extensive reedbeds.	Vagrant on the study site.
Circus maurus (Black Harrier)	Near-threatened	Generally confined to the clay grassland of the southern part of Mpumalanga	Irregular winter visitor.
Eupodotis senegalensis (White-bellied Korhaan)	Vulnerable	Prefers transitional habitat between grassland and savanna (e.g. Bankenveld).	Unlikely to occur.
Eupodotis caerulescens (Blue Korhaan)	Near-threatened	Prefers extensive open short grassland and cultivated land.	An uncommon resident on Site 10.
Falco naumanni (Lesser Kestrel)	Vulnerable	The open grassland patches provide foraging habitat.	A common summer visitor on the study area.
Falco biarmicus (Lanner Falcon)	Near-threatened	Varied, but prefers to nest and roost on steep vertical cliffs.	A common foraging and possible breeding resident on the void system near Site 10.
Geronticus calvus (Southern Bald Ibis)	Vulnerable	A species restricted to montane grassland (especially when burned) and breed/nest on steep cliffs.	A common foraging visitor on Site 10 (and possible breeding visitor).
Glareola nordmanni (Black-winged Pratincole)	Near-threatened	A species of extensive open grassland, usually near wetlands. Often forages over agricultural fields.	A common summer visitor on the study area.

Species	Red Data Status	Preferred Habitat	Potential Likelihood of Occurrence
Mycteria ibis (Yellow-billed Stork)	Near-threatened	Prefers shoreline habitat bordering large impoundments and extensive wetland systems.	An irregular (occasional) foraging visitor on the study area.
Oxyura maccoa (Maccoa Duck)	Near-threatened (BirdLife, 2008)	Restricted to large alkaline pans and other inland water bodies.	An uncommon foraging visitor on the endorheic pan near Site 16.
Phoenicopterus minor (Lesser Flamingo)	Near-threatened	Restricted to large alkaline pans and other inland water bodies.	Unlikely to occur.
Phoenicopterus ruber (Greater Flamingo)	Near-threatened	Restricted to large saline pans and other inland water bodies.	Unlikely to occur.
Sagittarius serpentarius (Secretarybird)	Near-threatened	Prefers open grassland or lightly wooded habitat.	An irregular visitor on the grassland units on Site 10.
Tyto capensis (African Grass Owl)	Vulnerable	Prefers rank moist grassland that borders drainage lines or wetlands.	Rare resident, probably absent from the study site.

5.5 Aquatic ecology

The overall study region has been defined as the Highveld Ecoregion, while the hydrology within the region is dominated by the Steenskoolspruit that drains the Quaternary Catchment B11D in a northerly direction. The Steenskoolspruit is a perennial tributary of the Olifants River (Olifants River Catchment – B11).

The Present Ecological State (PES) scores for both these rivers systems have been rated as Class D, Largely Modified by the Department of Water Affairs (DWA – RQS website), and due to the ecosystems processes that these rivers maintain downstream, they have been rated as Critically Endangered (SANBI – BGIS). The PES scores for all the main-stem systems in the Olifants catchment have been re-evaluated using an updated PES model, but as such the scores due to present land use have remain unchanged (Louw pers comm., 2011, DWS, 2014).

The proposed site is a significant distance from these river systems (Figure 11) and well beyond any of the prescribed buffers (30 m). Potential impacts would thus be limited to indirect impact such as failed pollution control dams or seepage into a groundwater system. All reports on the greater Olifants River systems indicated that these rivers are being placed under great pressure due to the mining and power generation activities. These as well as agriculture impacts on the water quality and quantity of these rivers and have thus reduced the aquatic biodiversity within the region (Kotze & Louw, 2011).

The presence of the “Vulnerable” Marsh Sylph butterfly (*Metisella meninx),* African Grass Owl (*Tyto capensis*) and the African Marsh Harrier (*Circus ranivorus*) could not be confirmed during the site visits but are known to occur within the region, while suitable species (butterfly) and habitat (raptors) are present within the site.

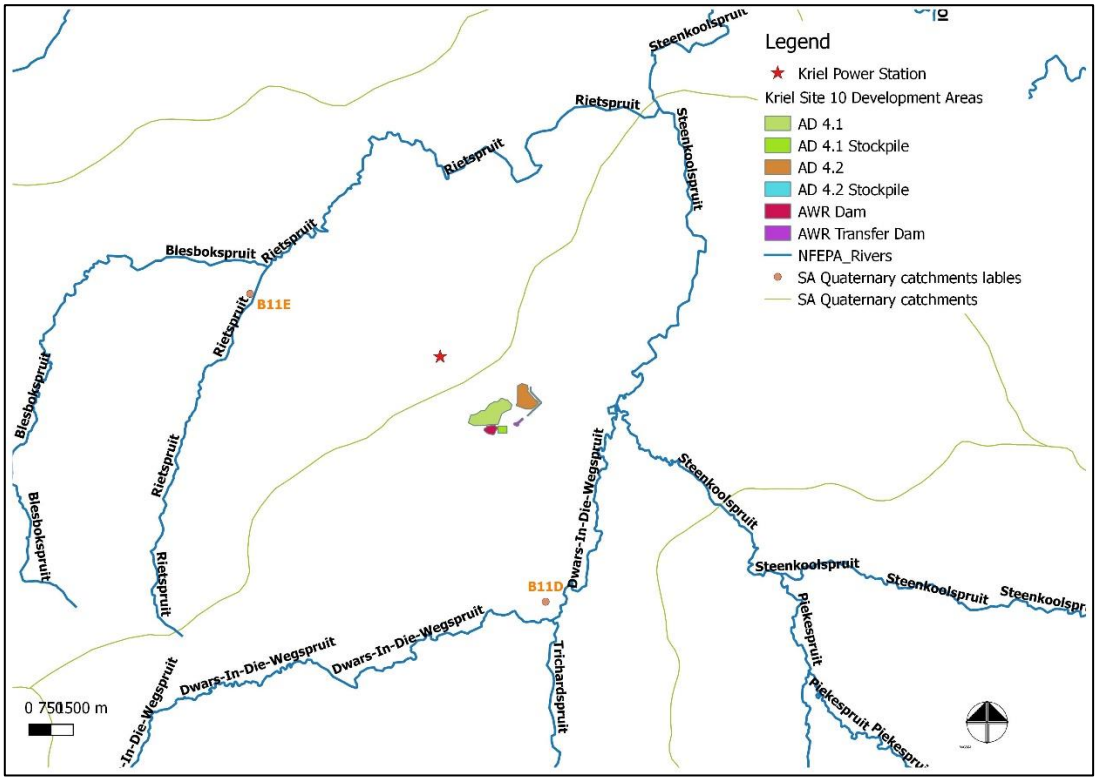

Figure 8: The main-stem rivers found within the respective quaternary catchments in the study region

6 Ecological importance assessment

The following aspects observed during the surveys highlighted the ecological importance of a number of habitats and were thus rated as ecological important (Medium) (Figure 9).

1. The old void system east of Site 10 provides structural roosting and breeding habitat for the “vulnerable” Southern Bald Ibis (*Geronticus calvus*) and “near-threatened” Lanner Falcon (*Falco biarmicus*) (Figure 9). Both species were confirmed from the same void system on an area adjacent to the study site.

2. Although artificial, the void system is regarded as an important daily dispersal corridor for certain wading and waterbird taxa (anatids and members of the Phalacrocoracidae) that regularly utilise these areas to access the nearby Steenkoolspruit and Olifants Rivers (Figure 9).

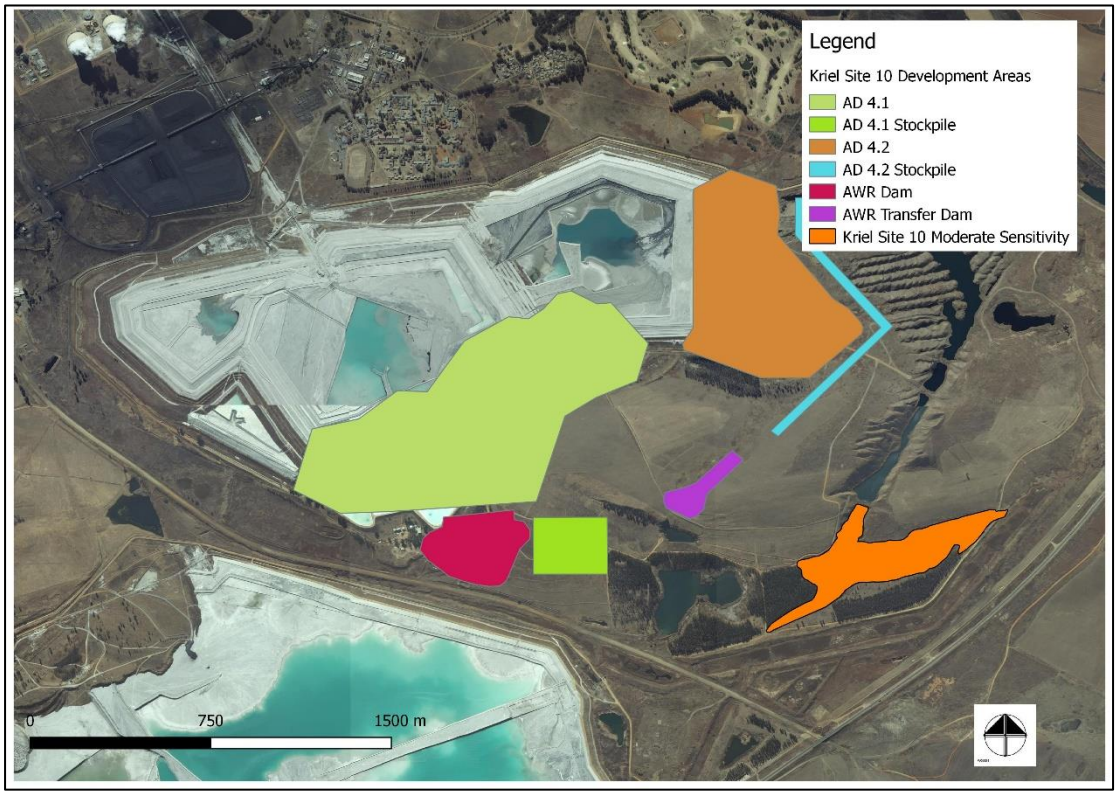

Figure 9: A sensitivity map illustrating the biodiversity and ecosystem features on Site 10 (all remaining areas were rated as LOW)

7 Impact assessment

Five potential impacts were identified that could possibly result from the proposed construction and operation of the new ash dam. Most of the impacts were related to the initial construction phase (clearing) and the in the operational phase of the project.

Impacts related to the following were not rated as these are not applicable, i.e. proposed layout has now avoided these areas:

- Loss of natural wetland habitat
- Loss of any Critical Biodiversity Areas
- Habitat fragmentation, especially along drainage lines and wetland systems would be affected during the construction and operation of the dams. The significance of this would be rated high (no mitigation) due to the dependence of a number of the conservation needy species on these types of habitats and corridors within the region. However, as Site 10 has been selected, i.e. constructing within a previously disrobed area, no impact on any corridors is anticipated

7.1 Destruction of vegetation and loss of habitat

Phase	**Construction**	
Impact description	The construction of the ash dams would result in the removal and or destruction of the natural vegetation in the long-term. The significance of the impact would be LOW, with or without mitigation as most of the natural vegetation on the site is in a degraded or secondary state, thus the magnitude of the impact would be low and within a localised area.	
	Pre-Mitigation	**Post-mitigation**
Type	Negative	Negative
Extent	Local	Local
Magnitude	Low	Low
Duration	Long-term	Construction period
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Reversible	Reversible
Significance	Low	Low
Mitigation measure	• A search and rescue operation for both plants and fauna (particularly amphibians and reptiles) must be initiated prior to the commencement of any construction once the required permits are in place. Applications must be submitted to relevant authorities where applicable. • Re-vegetation as part of a rehabilitation plan is always advocated, however due the nature of the site, this may not be practical. It is suggested that the shallow topsoil layer be stockpiled separately from the subsoil layers, should the excavation exceed 0.5 m. When the construction has been completed, then the topsoil layers, which contain seed and vegetative material, should be reinstated last thus allowing plants to rapidly re-colonise the bare soil areas that will not form part of the proposed infrastructure. • Alien plant regrowth should also be monitored, and any such species should be removed during the construction phase.	

Phase	Operations	
Impact description	The status quo of the areas surrounding the undeveloped portions of the site would remain the same in the operational phase, with possible continued degradation of the environment due to the ever-increasing spread in alien plant invaders (e.g. Bidens pilosa). This is if the monitoring of alien vegetation is not continued from the construction phase.	
	Pre-Mitigation	**Post-mitigation**
Type	Negative	Negative
Extent	Local	Local
Magnitude	Low	Low
Duration	Long-term	Long-term
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Reversible	Reversible
Significance	Low	Low
Mitigation measure	With the construction mitigations in place and considering the present layout, large portions of the site, although with degraded vegetation communities it is recommending best practise soil conservation measures, during the operational phase, and limiting the further spread of alien invasive plant species is continued.	

7.2 Possible impact on surface water quality

Phase	Construction	
Impact description	Construction activities, most linked to clearing of the site, could result in erosion and downstream sedimentation of water courses, should surface runoff not be controlled. The impacts would be on a regional scale due to the current state of the Olifants Rivercatchment (low water quality).	
	Pre-Mitigation	**Post-mitigation**
Type	Negative	Negative
Extent	Regional	Regional
Magnitude	High	Low
Duration	Long-term	Long-term
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Reversible	Reversible
Significance	High	Low
Mitigation measure	With mitigation, i.e. appropriate stormwater control, and immediate rehabilitation of areas that won't be developed the impact would be LOW. It is also recommended that downstream areas are included into any of the existing monitoring plans, ensuring that the mitigations listed above are being effective.	

Phase	Operations	
Impact description	This situation would mainly only occur in the operation phase of the project. There exists the potential for surface water contamination due to uncontrolled run-off entering any local rivers or streams or seeping into subsurface systems from the ash dams. The impacts would be on a regional scale due to the current state of the Olifants catchment (low water quality).	
	Pre-Mitigation	**Post-mitigation**
Type	Negative	Negative
Extent	Regional	Regional
Magnitude	High	Low
Duration	Long-term	Long-term
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Reversible	Reversible
Significance	High	Low
Mitigation measure	With mitigation, i.e. appropriate stormwater control, installation of attenuation dams and cut-off drains, and lining the ash dam facilities (with appropriate monitoring and maintenance) the impact would be LOW. It is also recommended that downstream areas are included into any of the existing monitoring plans, ensuring that the mitigations listed above are being effective.	

7.3 Displacement of non-wetland associated fauna

Phase	Construction	
Impact description	Faunal displacement (disturbances) during construction activities would be limited to those species observed during this study. The significance of the impact would be rated LOW as there is still significant habitat found within in the region, and most of the species (e.g. Gerbils, Jackals & Mongoose) have already adapted to living within mining and agricultural areas. Thus, the impact would be short-term within the site, with a low magnitude.	
	Pre-Mitigation	**Post-mitigation**
Type	Negative	Negative
Extent	Local	Local
Magnitude	Low	Low
Duration	Short-term	Short-term
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Reversible	Reversible
Significance	Low	Low
Mitigation measure	With regard mitigation, it is recommended that the contractors during the initial construction limit the disturbance to areas that will remain, i.e. will not be development by the dams thus allowing and that these species to disperse naturally into the surrounding areas, assuming that access to surrounding areas / habitats are not prevented.	

Phase	Operations	
Impact description	Faunal displacement (disturbances) will be minimal during this phase, as all the observed species have already adapted to the present land use activities and will then return to any remaining areas	
	Pre-Mitigation	**Post-mitigation**
Type	Negative	Negative
Extent	Local	Local
Magnitude	Low	Low
Duration	Short-term	Short-term
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Reversible	Reversible
Significance	Low	Low
Mitigation measure	No animals must be disturbed within the remaining areas	

7.4 Possible loss Red Data Bird habitat

Phase	Construction	
Impact description	This would be a national impact due to the conservation status of these birds. However, as the favoured site within the old workings would remain, and that these birds have adapted to the adjacent ash dams, they would remain within these sites.	
	Pre-Mitigation	**Post-mitigation**
Type	Negative	Negative
Extent	National	National
Magnitude	High	Low
Duration	Long-term	Long-term
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Irreversible	Irreversible
Significance	High	Low
Mitigation measure	Mitigation would be to not allow the ash dam to extend its proposed eastern boundary, in order to retain these water bodies and cliff habitats. The impact would thus be Low to Moderate, as there is sufficient habitat within the region, thus the magnitude would be low. Should the project not go ahead, the birds would remain.	

Phase	Construction	
Impact description	Once the facilities have been constructed or in operation, no new impacts regard these species are anticipated. Assuming the mitigation is upheld	
	Pre-Mitigation	**Post-mitigation**
Type	Negative	Negative
Extent	National	National
Magnitude	High	Low
Duration	Long-term	Long-term
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Irreversible	Irreversible
Significance	High	Low
Mitigation measure	Mitigation would be to not allow the ash dam to extend its proposed eastern boundary, in order to retain these water bodies and cliff habitats. The impact would thus be Low to Moderate, as there is sufficient habitat within the region, thus the magnitude would be low.	

7.5 Cumulative Impact

Phase	Construction	
Impact description	The construction of the ash dams would result in the removal and or destruction of the natural vegetation in the long-term. Thus adding to the loss of natural vegetation within the region. However, the site has been chosen on the fact that area is already degraded (secondary grasslands). Furthermore, the consolidation of the ash dams into one area, thus limits the loss of habitat in the greater area, the need for additional services such as new roads and conveyors, which all in term lead to habitat fragmentation.	
	Pre-Mitigation	**Post-mitigation**
Type	Negative	Negative
Extent	Local	Local
Magnitude	Low	Low
Duration	Long-term	Construction period
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Reversible	Reversible
Significance	Low	Low
Mitigation measure	• A search and rescue operation for both plants and fauna (particularly amphibians and reptiles) must be initiated prior to the commencement of any construction once the required permits are in place. Applications must be submitted to relevant authorities where applicable. • Re-vegetation as part of a rehabilitation plan is always advocated, however due the nature of the site, this may not be practical. It is suggested that the shallow topsoil layer be stockpiled separately from the subsoil layers, should the excavation exceed 0.5 m. When the construction has been completed, then the topsoil layers, which contain seed and vegetative material, should be reinstated last thus allowing plants to rapidly re-colonise the bare soil areas that will not form part of the proposed infrastructure. • Alien plant regrowth should also be monitored, and any such species should be removed during the construction phase.	

Phase	Operations	
Impact description	The status quo of the areas surrounding the undeveloped portions of the site would remain the same in the operational phase, with the only threat being the increase in alien plant invader cover. This is if the monitoring of alien vegetation is not continued from the construction phase.	
	Pre-Mitigation	**Post-mitigation**
Type	Negative	Negative
Extent	Local	Local
Magnitude	Low	Low
Duration	Long-term	Long-term
Probability	Probable	Probable
Confidence	Certain	Certain
Reversibility	Reversible	Reversible
Significance	Low	Low
Mitigation measure	With the construction mitigations in place and considering the present layout, large portions of the site, although with degraded vegetation communities it is recommending best practise soil conservation measures and limiting the further spread of alien invasive plant species is continued.	

8 Conclusion and recommendations

Site 10 is entirely composed of artificial habitat types (e.g. rehabilitated grassland) and is also adjacent to existing slimes dams. Should it be considered for use, operational disturbances should be limited by the allocation of an appropriate buffer or set-back area around the void / cliff areas (the breeding and roosting area of two Red Data bird species). With the amended layout of Site 10, even fewer impacts / habitat loss is anticipated.

Impacts on the regional vegetation with regard the site would be minimal due to the degraded nature of the site.

Set-back areas or buffer zones are allocated to sensitive features to alleviate the effect of habitat fragmentation and edge effects. The choice of an appropriate set-back distance is complex since different species and even different taxon groups demand different habitat types or home ranges to maintain a viable population in the long term.

Table 5 summarises the alert and flight initiation distances for different bird species when incubating eggs or when approached by humans on foot (the data are extrapolated from studies conducted abroad). It is evident from Table 5 that the minimum approaching distance for most bird taxa ranges from 5 m to more than 300 m before flying off.

However, it should be emphasized that these distance values are not necessarily related to disturbances caused by noise-generation. Therefore, a buffer of at least 300 m should be allocated to the void system (the buffer area should be negotiated with the assistance from MTPA). The newly proposed Site 10 layout would meet these requirements as the sensitive bird habitat is between 400m and 700m away.

Table 5: The flight and alert distances (m) for selected waterbird and terrestrial species when approached by humans (data obtained from Ruddock & Whitfield (2007) and Burton *et al.* (2002).

Species	Mean Alert Distance	Mean Flight Initiation Distance
Red-throated Diver (*Gavia stellata*)	225 (13)	125 (15)
Black-throated Diver (*Gavia arctica*)	400 (10)	225 (11)
Slavonian Grebe (*Podiceps auritus*)	75 (5)	30 (5)
Goldeneye (*Clangula bucephala*)	5 (4)	5 (8)
Common Scotor (*Melanitta nigra*)	40 (2)	5 (3)
Marsh Harrier (*Circus aeruginosus*)	215 (4)	30 (3)
White-tailed Eagle (*Haliaeetus albicilla*)	510 (8)	125 (11)
Peregrine Falcon (*Falco peregrinus*)	225 (26)	125 (31)
Wood Sandpiper (*Tringa glareola*)	225 (3)	5 (5)
Long-eared Owl (*Asio otus*)	30 (6)	5 (7)
Barn Owl (*Tyto alba*)	5 (11)	5 (11)

Species	Humans on foot
Dunlin (*Calidris alpina*)	10-163
Common Redshank (*Tringa totanus*)	10-110
Brent Goose (*Branta bernicla*)	50-105
Common Ringed Plover (*Charadrius hiaticula*)	121
Grey Plover (*Pluvialis squatarola*)	124
Northern Shelduck (*Tadorna tadorna*)	145-250
Eurasian Curlew (*Numenius arquata)*	38-339

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10 Appendices

10.1 Mammal species list

A list of mammal species with distribution ranges sympatric to that of the study area and their probability of occurrence. The conservation status of species was chosen according to Friedmann & Daly (2004) and nomenclature according to Skinner & Chimimba (2005).

Scientific Name	Vernacular Name	Probability of Occurrence	Habitat	National Conservation Status
Eulipotyphla: Soricidae				
Crocidura cyanea	Reddish-Grey Musk Shrew	High	Dry terrain among rocks in dense scrub and grass, in moist places and in hedges. Wet vleis with good grass cover.	Data Deficient
Crocidura mariquensis	Swamp Musk Shrew	Low	Moist habitats, e.g. thick grass along riverbanks, reedbeds and in swamps.	Data Deficient
Crocidura silacea	Lesser Grey-brown Musk Shrew	High	Varied, from savanna to grassland.	Data Deficient
Chiroptera: Nycteridae				
Nycterus thebaica	Egyptian Slit-faced Bat	High	Varied, roost in building and trees.	Least Concern
Chiroptera: Vespertilionidae				
Neoromicia capensis	Cape Serotine Bat	High, a widespread species likely to occur	Variable. Commonly enters houses and readily visits lights.	Least Concern
Scotophilus dinganii	Yellow House Bat	Peripheral	Varied; roosts in a variety of cavities; widespread.	Least Concern
Chiroptera: Molossidae				
Tadarida aegyptiaca	Egyptian Free-Tailed Bat	High, a widespread species likely to occur	Cosmopolitan, occurring in all vegetation types.	Least Concern
Lagomorpha: Leporidae				

Scientific Name	Vernacular Name	Probability of Occurrence	Habitat	National Conservation Status
Lepus saxatilis	Shrub Hare	High, a widespread species likely to occur	Savanna woodland and scrub with grass cover.	Least Concern
Rodentia: Pedetidae				
Pedetes capensis	Springhare	Medium	Sandy soils with short vegetation.	Least Concern
Rodentia: Bathyergidae				
Cryptomys hottentotus	African Mole-rat	High, a very widespread species likely to occur	Wide diversity of substrates, from sandy soil to heavier compacted types.	Least Concern
Rodentia: Hystricidae				
Hystrix africaeaustralis	Cape Porcupine	High, a widespread species likely to occur	Catholic but prefers broken country with hills and rocks.	Least Concern
Rodentia: Muridae				
Dendromus melanotis	Grey Climbing Mouse	High, could occur.	Stands of tall grasses (e.g. *Hyparrhenia* spp.) with bushes and other thick vegetation.	Least Concern
Dendromus mystacalis	Chestnut Climbing Mouse	High, could occur.	Stands of tall grasses (e.g. *Hyparrhenia* spp.) with bushes and other thick vegetation.	Least Concern
Tatera brantsii	Highveld Gerbil	High, widespread and abundant	Sandy soils with some cover of grass, scrub or open woodland.	Least Concern
Rhabdomys pumilio	Four-striped Grass Mouse	High, a widespread species likely to occur	Grassland with good grass cover.	Least Concern
Mus minutoides	Pygmy Mouse	Medium; could occur	Varied, from savanna to grassland.	Least Concern
Mastomys coucha/natalensis	Multimammate Mouse	High, a widespread species likely to occur	Wide habitat tolerance, including human habitation.	Least Concern
Otomys angoniensis	Angoni Vlei Rat	Low, habitat marginal.	Grassland, abundant in moist habitats in damp soil along vleis, rivers and streams or on the fringes of a swamp.	Least Concern

Scientific Name	Vernacular Name	Probability of Occurrence	Habitat	National Conservation Status
Otomys irroratus	Vlei Rat	Low, habitat marginal.	Grassland, abundant in moist habitats in damp soil along vleis, rivers and streams or on the fringes of a swamp.	Least Concern
Carnivora: Canidae				
Vulpes chama	Cape Fox	High, likely to occur	Savanna, shrubland and grassland.	Least Concern
Canis mesomelas	Black-Backed Jackal	High, a widespread species likely to occur	Wide habitat tolerance; arid, savanna and well watered regions. Absent from forests.	Least Concern
Carnivora: Mustelidae				
Aonyx capensis	Cape Clawless Otter	Medium could use the old void system during foraging bouts.	Permanent rivers and streams with crustaceans and fish.	Least Concern
Carnivora: Mustelidae				
Ictonyx striatus	Striped Polecat	Medium, could occur	Varied, from forest to grassland.	Least Concern
Carnivora: Herpestidae				
Galerella sanguinea	Slender Mongoose	High, a widespread species likely to occur	Catholic habitat requirements, arid to more mesic regions. Cover in the form of holes in the ground, hollow logs or rocks are essential.	Least Concern
Cynictis penicillata	Yellow Mongoose	High, widespread species likely to occur	Open areas such as vleis and open grassland around waterholes.	Least Concern
Suricata suricatta	Suricate	Medium, could occur	Open savanna and grassland.	Least Concern

Scientific Name	Vernacular Name	Probability of Occurrence	Habitat	National Conservation Status
Carnivora: Viverridae				
Genetta genetta	Small-Spotted Genet	High, a widespread species likely to occur	Savanna, adapts well to rural gardens and urban areas.	Least Concern
Genetta maculata	Common Large-Spotted Genet	High, a widespread species likely to occur	Varied; adapts well to rural gardens and urban areas.	Least Concern
Carnivora: Felidae				
Felis silvestris lybica	African Wild Cat	Medium, could occur.	Varied although cover is required.	Least Concern
Ruminantia: Bovidae				
Raphicerus campestris	Steenbok	High, likely to occur	Drier savanna, grassland and shrublands.	Least Concern
Sylvicapra grimmia	Common Duiker	High, a widespread species likely to occur	Varied, all major biomes.	Least Concern

10.2 Amphibian species list

A list of amphibian species with distribution ranges that correspond to that of the study area and their probability of occurrence.

Scientific Name	Vernacular Name	Occurrence	Habitat
Bufonidae			
Amietophrynus gutturalis	Guttural Toad	High, a widespread species.	Cosmopolitan, common in urban environments.
Amietophrynus rangeri	Raucous Toad	High, a widespread species.	Inundated grassland, and manmade impoundments
Schismaderma carens	Red Toad	High, a widespread species. Breeding habitat is absent from Site 16.	Prefers deep water bodies for breeding.

Scientific Name	Vernacular Name	Occurrence	Habitat
Hyperoliidae			
Kassina senegalensis	Bubbling Kassina	High, a widespread species.	Inundated grassland and vleis.
Phrynobatrachidae			
Phrynobatrachus natalensis	Snoring Puddle Frog	Marginal, could occur.	Inundated grassy depressions.
Pyxicephalidae			
Cacosternum boettgeri	Boettger's Caco	High, a widespread species.	Marsh, vleis and inundated grassland.
Amietia angolensis	Common River Frog	High, a widespread species likely to occur (only Site 10).	Grassland streams and ponds
Amietia fuscigula	Cape River Frog	High, a widespread species likely to occur (Site 10 only).	Streams and ponds. Prefers well-vegetated waterways
Strongylopus fasciatus	Striped Stream Frog	High, a widespread species likely to occur on Site 10 only.	Streams, pans, dams, seeps with grassy margins
Strongylopus grayii	Clicking Stream Frog	Could occur although peripheral to the study area.	Varied.
Tomopterna cryptotis	Tremolo Sand Frog	High, likely to occur.	Varied, breed in shallow water at the edges of dams and pools.
Tomopterna natalensis	Natal Sand Frog	High, a widespread species likely to occur.	Temporally rain filled pools.
Pipidae			
Xenopus laevis	Common Platanna	High, likely to occur on Site 10.	Permanent water.

10.3 Bird species list

A list of bird species confirmed. # refers to the new SA numbers. Nomenclature, scientific and colloquial names were used according to Hockey *et al*. (2005).

Order	Family	#	Scientific Name	Colloquial Name
Galliformes	Phasianidae	8	*Scleroptila levaillantoides*	Orange River Francolin
		14	*Pternistis swainsonii*	Swainson's Spurfowl
	Numididae	20	*Numida meleagris*	Helmeted Guineafowl
Anseriformes	Anatidae	25	*Alopochen aegyptiacus*	Egyptian Goose
		27	*Plectropterus gambensis*	Spur-winged Goose
		33	*Anas undulata*	Yellow-billed Duck
Coraciiformes	Cerylidae	98	*Megaceryle maximus*	Giant Kingfisher
		144	*Cypsiurus parvus*	African Palm-Swift
Apodiformes	Apodidae	151	*Apus affinis*	Little Swift
Columbiformes	Columbidae	180	*Columba guinea*	Speckled Pigeon
		185	*Streptopelia senegalensis*	Laughing Dove
		187	*Streptopelia capicola*	Cape Turtle-Dove
		188	*Streptopelia semitorquata*	Red-eyed Dove
		179	*Columba livia*	Rock Dove
Gruiformes	Rallidae	224	*Gallinula chloropus*	Common Moorhen
		226	*Fulica cristata*	Red-knobbed Coot
Charadriiformes	Scolopacidae	232	*Gallinago nigripennis*	African Snipe
	Charadriidae	283	*Charadrius tricollaris*	Three-banded Plover
		291	*Vanellus armatus*	Blacksmith Lapwing
		297	*Vanellus coronatus*	Crowned Lapwing
Falconiformes	Accipitridae	412	*Falco biarmicus*	Lanner Falcon
Coconiiformes	Phalacrocoracidae	426	*Phalacrocorax africanus*	Reed Cormorant
		428	*Phalacrocorax lucidus*	White-breasted Cormorant
	Ardeidae	439	*Ardea cinerea*	Grey Heron
		440	*Ardea melanocephala*	Black-headed Heron
		443	*Bubulcus ibis*	Cattle Egret
		442	*Ardea purpurea*	Purple Heron
	Threskiornithidae	457	*Bostrychia hagedash*	Hadeda Ibis

Order	Family	#	Scientific Name	Colloquial Name
		458	*Geronticus calvus*	Southern Bald Ibis
		459	*Threskiornis aethiopicus*	African Sacred Ibis
		460	*Platalea alba*	African Spoonbill
Passeriformes	Corvidae	571	*Corvus albus*	Pied Crow
	Laniidae	576	*Lanius collaris*	Common Fiscal
	Hirundinidae	594	*Riparia paludicola*	Brown-throated Martin
		609	*Hirundo spilodera*	South African Cliff-Swallow
	Sylviidae	767	*Cossypha caffra*	Cape Robin-Chat
	Cisticolidae	683	*Cisticola tinniens*	Levaillant's Cisticola
		687	*Cisticola juncidis*	Zitting Cisticola
		692	*Prinia subflava*	Tawny-flanked Prinia
	Alaudidae	735	*Calandrella cinerea*	Red-capped Lark
	Muscicapidae	782	*Saxicola torquatus*	African Stonechat
		793	*Myrmecocichla formicivora*	Anteating Chat
	Sturnidae	810	*Acridotheres tristis*	Common Myna
	Ploceidae	846	*Ploceus velatus*	Southern Masked-Weaver
		854	*Quelea quelea*	Red-billed Quelea
		855	*Euplectes afer*	Yellow-crowned Bishop
		857	*Euplectes orix*	Southern Red Bishop
		863	*Euplectes progne*	Long-tailed Widowbird
	Estrildidae	868	*Ortygospiza atricollis*	African Quailfinch
		878	*Estrilda astrild*	Common Waxbill
	Passeridae	901	*Passer domesticus*	House Sparrow
		903	*Passer melanurus*	Cape Sparrow
	Motacillidae	908	*Motacilla capensis*	Cape Wagtail
		915	*Macronyx capensis*	Cape Longclaw
		920	*Anthus cinnamomeus*	African Pipit
	Fringilidae	933	*Serinus canicollis*	Cape Canary
		935	*Serinus atrogularis*	Black-throated Canary

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

INTEGRATED ENVIRONMENTAL IMPACT ASSESSMENT:
PROPOSED EXPANSION OF ASH DISPOSAL FACILITY, KRIEL POWER STATION, MPUMALANGA

Specialist:	Scherman Colloty and Associates		
Contact person:	Dr Brian Colloty		
Postal address:	1 Rossini Rd Port Park PE		
Postal code:	6070	Cell:	083 498 3294
Telephone:	041 366 2077	Fax:	—
E-mail:	brian@itsnet.co.za		
Professional affiliation(s) (if any)	SACNASP Ecologist 400268/07		

Project Consultant:	Aurecon South Africa (Pty) Ltd		
Contact person:	Franci Gresse		
Postal address:	PO Box 494, Cape Town, South Africa		
Postal code:	8000	Cell:	082 8912384
Telephone:	021 5266022	Fax:	086 7231750
E-mail:	Franci.Gresse@aurecongroup.com		

4.2 The specialist appointed in terms of the Regulations_

I, Brian Colloty , declare that --

General declaration:

I act as the independent specialist in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
all the particulars furnished by me in this form are true and correct; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Schoeman Colloty and Associates

Name of company (if applicable):

27/07/17.

Date: